



FROM DICTIONARY TO LLMs: RETHINKING LANGUAGE LEARNING, ASSESSMENT, AND TEACHER ROLES IN THE ERA OF GENERATIVE AI

Novi Sylvia¹
¹novi.sylvia@upi.edu

¹Universitas Pendidikan Indonesia, Bandung, Jawa Barat, Indonesia

ABSTRACT

Assessment in language learning has become increasingly complex in the era of generative artificial intelligence, particularly when learners' integrity and ethical awareness are not yet sufficiently developed. This study aims to map the shifting landscape of language learning amid the rapid emergence of generative AI tools such as ChatGPT and Gemini. Employing a literature review methodology, this study analyzed 20 relevant peer-reviewed articles published between 2023 and 2025 that examine language learning practices in the context of generative AI. The findings reveal an evolutionary shift in language learning practices, moving from passive reference tools such as printed and digital dictionaries toward interactive, adaptive, and dialogic systems. The expanded access to linguistic input, real-time feedback, and personalized practice is concentrated on practical and procedural aspects of language learning, including writing support, grammar correction, vocabulary practice, translation, and automated feedback rather than deeper understanding of structures, meaning-making processes, and the construction of knowledge in long-term memory. This imbalance indicates that current AI-supported practices tend to enhance efficiency and surface-level performance rather than durable language competence. The findings suggest an urgent need to redesign language assessment practices that align with emerging cultures of AI-assisted autonomous learning while maintaining academic integrity and meaningful learning.

Keywords: Language learning, generative AI, assessment and teachers' role

A. INTRODUCTION

The rapid advancement of generative artificial intelligence has reshaped the global landscape of language technology, revealing a clear asymmetry in how different languages benefit from large language models (LLMs). Languages with extensive digital corpora and strong industrial support, most notably English, followed by several widely used European and major Asian languages, have experienced the fastest and most visible gains in accuracy and fluency (Ahuja et al., 2023). Large-scale multilingual evaluations consistently show that LLM performance is



strongest in high-resource languages, reflecting both the abundance of training data and the dominance of English-centered evaluation practices. Although recent developments demonstrate rapid progress in several major non-English languages, where LLMs increasingly approach human-like performance when appropriately prompted (Sallam et al., 2025), the performance gap between high-resource and low-resource languages remains substantial. This persistent imbalance highlights a structural challenge that technological breakthroughs tend to reinforce existing linguistic hierarchies rather than distribute language capabilities evenly, positioning language education at the intersection of technological progress and long-standing issues of linguistic inequality (Ismadi & Sylvia, 2022).

This asymmetrical development is likely to persist as generative AI systems such as ChatGPT, Gemini, and similar models continue to evolve. These systems are projected to become more powerful, increasingly multimodal, and more deeply integrated across domains, processing text, images, audio, and video within unified language–reasoning architectures (Rahman et al., 2025). Such models are no longer designed as stand-alone tools but as continuously evolving foundations embedded within broader digital ecosystems (Hagos et al., 2024). At the same time, substantial progress is being made in multilingual performance through techniques such as multilingual instruction fine-tuning, cross-lingual alignment, and culturally informed adaptation (Kadiyala et al., 2025), enabling noticeable improvements even with relatively limited additional data. Beyond expanding capabilities, medium-term development trajectories increasingly emphasize efficiency, interpretability, and the mitigation of bias and hallucination (Alberts et al., 2023; Rahman et al., 2025). As generative AI becomes more deeply integrated into sensitive domain, including education, its growing influence is accompanied by heightened demands for regulation, governance, and ethical oversight (Dave et al., 2023; Yildiz Durak et al., 2025).

Recent research suggests that the central challenge in language education is not the fear of being “replaced by AI,” but rather how generative AI can be integrated critically without undermining the fundamental goals of language learning and the human-centered role of teachers. As large language models increasingly provide grammar explanations, dialogue simulations, translations, and error correction, traditional notions of teacher authority are being disrupted, prompting a reconceptualization of teachers’ professional identity toward facilitators



of human interaction and coaches of AI literacy (Gruzdev, 2025; Tutton & Cohen, 2025). Teachers hold an expanded role that extends beyond instruction to include guiding students' AI use, designing AI-informed curricula, and supporting ethical decision-making in learning (Cheng et al., 2025). However, many teachers and teacher educators remain insufficiently prepared for this shift, expressing limited confidence and competence in addressing the pedagogical, curricular, and assessment-related implications of generative AI (Gruzdev, 2025; Moorhouse & Kohnke, 2024). From a cognitive perspective, meaningful language learning depends on the construction of stable linguistic schemas in learners' long-term memory (Sylvia, 2019), a process that cannot be replaced by surface-level AI assistance or automated task completion. When pedagogical integration remains superficial, such as using AI primarily for material preparation rather than embedding it into interaction and assessment, learning risks becoming temporary, ethically problematic, disconnected from deeper cognitive processing. These tensions are further intensified by concerns about academic integrity, bias, hallucination, learner overdependence, and the potential erosion of authentic human interaction and cultural nuance that are central to language learning (Chung & Jeong, 2024; L. Zhang, 2025).

The use of generative AI in language learning has already become widespread and largely unavoidable, particularly among students. Although no single global statistic captures this phenomenon, studies conducted across diverse national contexts consistently indicate that approximately half to three-quarters of university students have used generative AI for learning purposes, including language learning (Ajalo et al., 2025; Alotaibi et al., 2025; Epaminonda et al., 2025). Students reveal that generative AI is commonly employed for language-related tasks, including writing assignments, grammar correction, vocabulary development, translation, and exam preparation (Baskara, 2025; Karataş et al., 2024; Shahriar, 2025; Xiao & Zhi, 2023). The scale and consistency of these findings suggest that student adoption has progressed faster than institutional readiness, creating a widening gap between actual learning practices and existing pedagogical and assessment frameworks. This reality places increasing pressure on language education systems to reconsider how learning outcomes and assessments can validly capture students' cognitive engagement and language competence in an era where AI-assisted learning has become normalized. This study aims to map the shifting landscape of language learning in the era of generative AI through a systematic literature review. Specifically, it seeks to identify dominant trends in AI-supported language learning, examine



their implications for cognitive depth, assessment practices, and teacher roles, and provide conceptual insights to support the development of language learning in AI-mediated environments.

Within the Indonesian context, these challenges carry particular significance, as English is learned predominantly as a foreign language (EFL) rather than as a language of daily communication. Indonesian EFL learners often rely heavily on formal instruction, structured input, and teacher mediation to develop linguistic competence, making the integration of generative AI both promising and pedagogically sensitive. While AI tools may offer expanded exposure to English through instant feedback, translation, and simulated interaction, their dominance also risks reinforcing surface-level language use, shortcut learning strategies, and dependency that undermine long-term cognitive development. Moreover, structural disparities in digital access, teacher readiness, and institutional policy across Indonesian educational settings further complicate equitable AI integration. Understanding how generative AI intersects with cognitive depth, assessment validity, and teacher agency is therefore crucial for ensuring that AI-enhanced EFL learning in Indonesia supports meaningful language acquisition rather than accelerating instrumental, exam-oriented, or ethically fragile practices.

B. METHOD

This study employed a systematic literature review (Paul et al., 2021) approach to examine the transformation of language learning in the era of generative artificial intelligence. The review focused on 20 scholarly publications published between 2023 and 2025, corresponding to the period following the widespread emergence and educational adoption of generative AI tools such as ChatGPT, Gemini, and other large language models. This timeframe was selected to capture the most recent and relevant research that reflects contemporary practices, challenges, and debates surrounding generative AI in language education.

Relevant studies were identified through systematic searches of major academic databases, including peer-reviewed journal articles and conference proceedings related to language learning and artificial intelligence in education. The inclusion criteria were as follows: (1) studies that explicitly discuss generative AI or large language models in the context of language learning or teaching, (2) publications written in English, and (3) studies that address



pedagogical practices, learner use, assessment implications, or teacher roles. Opinion pieces, non-academic sources, and studies unrelated to educational contexts were excluded.

The selected articles were analyzed thematically to identify recurring patterns, conceptual trends, and critical issues. The analysis focused on three main dimensions: (1) shifts in language learning practices, (2) implications for assessment and learning outcomes, and (3) changes in the professional roles of language teachers. Rather than quantifying effect sizes, this review emphasizes conceptual synthesis and critical interpretation to reveal how generative AI reshapes language learning ecosystems. Through this approach, the study aims to provide an integrative understanding of emerging trends while highlighting unresolved challenges and directions for future research.

C. FINDINGS

The reviewed literature reveals a clear evolutionary trajectory in language learning practices, moving from passive reference tools to interactive and adaptive systems powered by generative artificial intelligence. Language learning has progressively shifted from the use of printed dictionaries as static sources of meaning toward digital and online tools, and most recently toward intelligent, dialogic systems that provide real-time feedback and adaptive support. This evolution reflects broader changes in how learners access linguistic input, receive feedback, and engage with language as a dynamic system rather than a fixed body of knowledge.

In the early stages, up to the early 2000s, printed monolingual and bilingual dictionaries served as the primary tools for reading and writing in foreign language learning. Scholarly debates during this period focused on dictionary types and their effectiveness in supporting receptive and productive vocabulary knowledge (Lew et al., 2024). With the expansion of internet access, the emphasis gradually shifted from dictionary type to medium, as electronic and online dictionaries enabled faster navigation, hyperlinks, and seamless integration with digital reading environments. More recent studies indicate that learners now rely heavily on digital dictionaries and machine translation tools, such as Google Translate, for rapid meaning checking and instant translation (Lenard & Šokčević, 2024), signaling a growing preference for efficiency and immediacy in language support.



This trajectory continued into the phase where digital dictionaries and mobile applications functioned as transitional technologies toward more intelligent systems. Reviews of enhanced learning technologies between 2014 and 2019 document widespread use of vocabulary applications, electronic dictionaries, and mobile-assisted language learning as precursors to AI-driven tools (Chernenko, 2024). Research on artificial intelligence in computer-assisted language learning (CALL) further maps a transition toward intelligent CALL (ICALL), incorporating natural language processing, data-driven learning, automated writing evaluation, automatic speech recognition, chatbots, and intelligent tutoring systems (Son et al., 2025). Unlike earlier tools, these systems do not merely provide definitions but are capable of detecting errors, offering targeted feedback, assessing learner performance, and personalizing learning trajectories (Davin, 2024; Ismoilovna, 2025; Rebolledo Font de la Vall & González Araya, 2023).

The emergence of large language models and generative AI represents a qualitative shift in this evolution. LLM-based chatbots, such as ChatGPT, now function as lexical and pedagogical tools that go beyond traditional dictionaries. Experimental studies demonstrate that, for certain comprehension and phrase-production tasks, ChatGPT can outperform monolingual and bilingual dictionaries (Lew et al., 2024). Other studies report that chatbot-based systems and generative AI platforms enhance vocabulary acquisition and retention, facilitate incidental learning, and support productive language use (Wang et al., 2024; Z. Zhang & Huang, 2024). In addition, generative AI enables the creation of customized content, simulated dialogues, adaptive exercises, and even immersive learning environments through virtual and augmented reality (Creely, 2024; Maiboroda, 2024; Mateos Blanco et al., 2024), expanding opportunities for contextualized language and cultural practice.

Despite these advances, the findings also indicate that the use of AI in language learning is predominantly concentrated at the level of practice rather than deep linguistic construction. Generative AI is most frequently employed as an adaptive personal tutor, an automated feedback provider, and a communication practice partner. At the learner level, adaptive applications adjust task difficulty, exercise types, and repetition schedules based on individual performance (Ismoilovna, 2025; Rebolledo Font de la Vall & González Araya, 2023), while algorithms such as spaced repetition and learning analytics significantly improve vocabulary



retention and grammatical accuracy (Lü, 2025; Urbaite, 2025). Chatbots and LLMs are widely used for conversation practice, grammar explanation, real-time correction, summarization, dialogue generation, and academic writing support (Čavojský et al., 2023; Son et al., 2025; Song & Song, 2023; Yuxuan et al., 2025; Z. Zhang & Huang, 2024). Automated feedback technologies further reinforce this practice-oriented orientation. Automated Writing Evaluation systems provide feedback on grammar, lexis, coherence, and textual organization (Cong, 2024; Son et al., 2025; Song & Song, 2023), while Automatic Speech Recognition tools analyze pronunciation and fluency, offering immediate corrective suggestions (Rebolledo Font de la Vall & González Araya, 2023; Son et al., 2025). Machine translation tools and vocabulary explanation features remain central for comprehension support, enabling learners to access complex or authentic texts more easily (Hockly, 2023; Rebolledo Font de la Vall & González Araya, 2023; Son et al., 2025). Collectively, these techniques position generative AI as an ever-available learning partner that enhances efficiency, fluency, and accessibility.

D. DISCUSSION

Based on the findings, the dominance of LLMs usage raises critical pedagogical concerns. While AI effectively supports routine practice and surface-level performance, fewer studies address how such tools contribute to learners' understanding of underlying language structures, meaning-making processes, and long-term cognitive development. From a cognitive perspective, meaningful language learning requires the construction of stable linguistic schemas in long-term memory, a process that depends on sustained engagement with form, meaning, and use (Sylvia, 2019). When AI is used primarily to accelerate task completion or polish outputs, there is a risk that learning becomes temporary and performance-driven rather than conceptually grounded. In classroom level, assessment should be well designed since commonly teachers also face challenges in understanding the media and harnessing the method development (Sylvia, 2021; Sylvia et al., 2023; Sylvia & Hadiana, 2024). Chatbots and LLMs are widely used by students for the language learning improvement with and without involving the real independent thought processes in which (human) teachers should play the vital role.

These findings have important implications for language teachers and teacher education. As generative AI increasingly handles routine exercises, feedback, and content generation, the role of the language teacher shifts toward designing cognitively demanding tasks, fostering critical



language awareness, and guiding ethical and reflective AI use. Consequently, language teacher education and professional development must prioritize AI mastery not only at the level of tool usage but also at the level of pedagogical integration and assessment design. Teachers need to be equipped to decide when AI support enhances learning and when it may undermine learner autonomy, authenticity, and deep language processing. Equally important is the redesign of assessment practices to ensure that they validly capture students' cognitive engagement and language competence in AI-mediated learning environments. Overall, this study suggests that generative AI should be positioned as a pedagogical partner rather than a replacement for human instruction. Its potential to enrich language learning is substantial, but only when embedded within instructional and assessment frameworks that prioritize cognitive depth, ethical guidance, and the irreplaceable human dimensions of language learning.

his study highlights critical implications for English as a Foreign Language (EFL) learning in Indonesia, where English is primarily acquired through formal instruction. While generative AI expands access to practice and feedback, uncritical use risks reinforcing surface-level, performance-oriented learning rather than the development of stable linguistic schemas. In contexts with limited authentic exposure, such as Indonesian EFL classrooms, AI-assisted learning must therefore be carefully aligned with pedagogical goals that prioritize cognitive engagement with form, meaning, and use.

The findings underscore the need for teachers to redesign learning tasks and assessments that make students' reasoning, reflection, and language choices visible, rather than relying solely on accuracy or output quality. Teacher education and professional development should move beyond technical AI literacy toward pedagogical and assessment competence, enabling teachers to judge when AI supports meaningful learning and when it undermines autonomy and authenticity. At the institutional level, assessment frameworks require reconsideration to ensure validity in AI-mediated learning environments. Overall, generative AI should be positioned as a pedagogical partner that enhances, rather than replaces, human-guided EFL instruction in Indonesia.

D. CONCLUSION

This review highlights a fundamental shift in language learning practices, evolving from reliance on printed dictionaries to the widespread use of large language models and generative



AI as interactive learning partners. The literature shows that generative AI has transformed how learners access linguistic input, receive feedback, and engage in language practice, offering unprecedented efficiency, personalization, and availability. However, this transformation remains uneven across languages and is largely concentrated at the level of procedural support, such as writing assistance, automated feedback, translation, and conversational practice. While these AI-supported practices enhance short-term performance and accessibility, they do not automatically foster deep linguistic understanding or durable language competence. Meaningful language learning depends on the construction of stable cognitive structures in learners' long-term memory, a process that requires intentional pedagogical design, sustained interaction, and reflective engagement. Those elements cannot be replaced by AI-driven task completion alone. Without careful guidance, the growing normalization of generative AI risks reinforcing surface learning and weakening the alignment between learning processes and assessment practices. Therefore, language teacher education and professional development must prioritize AI mastery not only at the level of tool usage but also at the level of pedagogical integration and assessment design. In English as a Foreign Language (EFL) contexts such as Indonesia, where learners rely heavily on formal instruction and assessment, these insights are particularly salient, underscoring the need to ensure that generative AI use supports deep cognitive language development rather than accelerating surface-level performance.

REFERENCES

- Ahuja, K., Diddee, H., Hada, R., Ochieng, M., Ramesh, K., Jain, P., Nambi, A., Ganu, T., Segal, S., Ahmed, M., Bali, K., & Sitaram, S. (2023). MEGA: Multilingual Evaluation of Generative AI. *Proceedings of the 2023 Conference on Empirical Methods in Natural Language Processing*, 4232–4267. <https://doi.org/10.18653/v1/2023.emnlp-main.258>
- Ajalo, E., Mukunya, D., Nantale, R., Kayemba, F., Pangholi, K., Babuya, J., Langoya Akuu, S., Namiro, A. M., Nsubuga, Y. B., Mpagi, J. L., Musaba, M. W., Oguttu, F., Kuteesa, J., Mubuuke, A. G., Munabi, I. G., & Kiguli, S. (2025). Widespread use of ChatGPT and other Artificial Intelligence tools among medical students in Uganda: A cross-sectional study. *PLOS ONE*, 20(1), e0313776. <https://doi.org/10.1371/journal.pone.0313776>
- Alberts, I. L., Mercolli, L., Pyka, T., Prenosil, G., Shi, K., Rominger, A., & Afshar-Oromieh, A. (2023). Large language models (LLM) and ChatGPT: what will the impact on nuclear medicine be? *European Journal of Nuclear Medicine and Molecular Imaging*, 50(6), 1549–1552. <https://doi.org/10.1007/s00259-023-06172-w>
- Alotaibi, H. M., Sonbul, S. S., & El-Dakhs, D. A. (2025). Factors influencing the acceptance and use of ChatGPT among English as a foreign language learners in Saudi Arabia. *Humanities and Social Sciences Communications*, 12(1), 628. <https://doi.org/10.1057/s41599-025-04945-2>



- Baskara, FX. R. (2025). ChatGPT and Google Gemini in EFL Education: A Qualitative Exploration of Pedagogical Efficacy among Indonesian Sophomores. *Journal of Languages and Language Teaching*, 13(1), 436. <https://doi.org/10.33394/jollt.v13i1.9926>
- Božić Lenard, D., & Šokčević, K. (2024). ESP students' attitudes towards using digital dictionaries and AI-based tools in language learning. *E-Mentor*, 107(5), 10–19. <https://doi.org/10.15219/em107.1684>
- Čavojský, M., Bugár, G., Kormaník, T., & Hasin, M. (2023). Exploring the Capabilities and Possible Applications of Large Language Models for Education. *2023 21st International Conference on Emerging ELearning Technologies and Applications (ICETA)*, 91–98. <https://doi.org/10.1109/ICETA61311.2023.10344166>
- Cheng, X., Lu, P., Qian, Y., & Garrett, S. (2025). Prospective roles of language teachers in AI-assisted language teaching: An action research. *International Journal of English for Academic Purposes: Research and Practice*, 5(1), 69–83. <https://doi.org/10.3828/ijeap.2025.5>
- Chernenko, A. (2024). Innovative approaches to development of foreign-language vocabulary: the role of modern digital tools in distance learning. *The Journal of V.N. Karazin Kharkiv National University. Series: Foreign Philology. Methods of Foreign Language Teaching*, 99, 141–147. <https://doi.org/10.26565/2786-5312-2024-99-18>
- Chung, J. Y., & Jeong, S.-H. (2024). Exploring the perceptions of Chinese pre-service teachers on the integration of generative AI in English language teaching: Benefits, challenges, and educational implications. *Online Journal of Communication and Media Technologies*, 14(4), e202457. <https://doi.org/10.30935/ojcm/15266>
- Cong, Y. (2024). AI Language Models: An Opportunity to Enhance Language Learning. *Informatics*, 11(3), 49. <https://doi.org/10.3390/informatics11030049>
- Creely, E. (2024). Exploring the Role of Generative AI in Enhancing Language Learning: Opportunities and Challenges. *International Journal of Changes in Education*, 1(3), 158–167. <https://doi.org/10.47852/bonviewIJCE42022495>
- Dave, T., Athaluri, S. A., & Singh, S. (2023). ChatGPT in medicine: an overview of its applications, advantages, limitations, future prospects, and ethical considerations. *Frontiers in Artificial Intelligence*, 6. <https://doi.org/10.3389/frai.2023.1169595>
- Davin, K. J. (2024). The issue: New technologies and language education. *The Modern Language Journal*, 108(2), 513–514. <https://doi.org/10.1111/modl.12925>
- Epaminonda, E., Ktorifou, D., Michailidis, M., & Efthymiou, L. (2025). Exploring Students' Familiarity, Usage Patterns, and Perceptions of Generative AI Tools in Education. *2025 IEEE Global Engineering Education Conference (EDUCON)*, 1–7. <https://doi.org/10.1109/EDUCON62633.2025.11016320>
- Gruzdev, A. V. (2025). The use of generative artificial intelligence in the study and teaching of foreign languages: the results of a systematic analysis. *Педагогика и Просвещение*, 1, 105–115. <https://doi.org/10.7256/2454-0676.2025.1.73607>
- Hagos, D. H., Battle, R., & Rawat, D. B. (2024). Recent Advances in Generative AI and Large Language Models: Current Status, Challenges, and Perspectives. *IEEE Transactions on Artificial Intelligence*, 5(12), 5873–5893. <https://doi.org/10.1109/TAI.2024.3444742>
- Hockly, N. (2023). Artificial Intelligence in English Language Teaching: The Good, the Bad and the Ugly. *RELC Journal*, 54(2), 445–451. <https://doi.org/10.1177/00336882231168504>
- Ismadi, H. D., & Sylvia, N. (2022). *Pengembangan Bahasa Indonesia di Era Revolusi 4.0. Badañ Pengembangan Dañ Pembinaan Bahasa.*



- Ismoilovna, A. D. (2025). Harnessing ai tools to enhance foreign language acquisition: innovations and impacts. *American Journal Of Social Sciences And Humanity Research*, 5(1), 22–25. <https://doi.org/10.37547/ajsshr/Volume05Issue01-07>
- Kadiyala, R., Pullakhandam, S., Gupta, S., Sharma, D., Purbey, J., Mehreen, K., Arham, M., & Farooq, H. (2025). Improving Multilingual Capabilities with Cultural and Local Knowledge in Large Language Models While Enhancing Native Performance. *ArXiv*.
- Karataş, F., Abedi, F. Y., Ozek Gunyel, F., Karadeniz, D., & Kuzgun, Y. (2024). Incorporating AI in foreign language education: An investigation into ChatGPT's effect on foreign language learners. *Education and Information Technologies*, 29(15), 19343–19366. <https://doi.org/10.1007/s10639-024-12574-6>
- Lew, R., Ptaszniak, B., & Wolfer, S. (2024). The effectiveness of ChatGPT as a lexical tool for English, compared with a bilingual dictionary and a monolingual learner's dictionary. *Humanities and Social Sciences Communications*, 11(1), 1324. <https://doi.org/10.1057/s41599-024-03775-y>
- Lü, X. (2025). A Data-Driven Exploration of AI-Enhanced Educational Models. *Studies in Linguistics and Literature*, 9(2), p10. <https://doi.org/10.22158/sll.v9n2p10>
- Maiboroda, R. (2024). Learning Languages in the 21st Century: the Digital and Ai Transformation. *International Journal Of Social Science Humanity & Management Research*, 03(11). <https://doi.org/10.58806/ijsshr.2024.v3i11n06>
- Mateos Blanco, B., Álvarez Ramos, E., Alejandre Biel, L., & Parrado Collantes, M. (2024). Vademecum of artificial intelligence tools applied to the teaching of languages. *Journal of Technology and Science Education*, 14(1), 77. <https://doi.org/10.3926/jotse.2522>
- Moorhouse, B. L., & Kohnke, L. (2024). The effects of generative AI on initial language teacher education: The perceptions of teacher educators. *System*, 122, 103290. <https://doi.org/10.1016/j.system.2024.103290>
- Paul, J., Lim, W. M., O' Cass, A., Hao, A. W., & Bresciani, S. (2021). Scientific procedures and rationales for systematic literature reviews (SPAR-4-SLR). *International Journal of Consumer Studies*, 45(4). <https://doi.org/10.1111/ijcs.12695>
- Rahman, A., Mahir, S. H., Tashrif, Md. T. A., Karim, Md. A., Aishi, A. A., Kundu, D., Debnath, T., Moududi, Md. A. A., Eidmum, Md. Z. A., Miah, A. S. M., Farid, F. Al, & Karim, H. A. (2025). Comparative analysis based on DeepSeek, ChatGPT, and Google Gemini: Features, techniques, performance, future prospects. *Systems and Soft Computing*, 7, 200396. <https://doi.org/10.1016/j.sasc.2025.200396>
- Rebolledo Font de la Vall, R., & González Araya, F. (2023). Exploring the Benefits and Challenges of AI-Language Learning Tools. *International Journal of Social Sciences and Humanities Invention*, 10(01), 7569–7576. <https://doi.org/10.18535/ijsshi/v10i01.02>
- Sallam, M., Alasfoor, I. M., W. Khalid, S., Al-Mulla, R. I., Al-Farajat, A., M. Mijwil, M., Zahrawi, R., Sallam, M., Egger, J., & Al-Adwan, A. S. (2025). Chinese generative AI models (DeepSeek and Qwen) rival ChatGPT-4 in ophthalmology queries with excellent performance in Arabic and English. *Narra J*, 5(1), e2371. <https://doi.org/10.52225/narra.v5i1.2371>
- Shahriar, A. (2025). Exploring efl students' perspectives on the use of ai chatbots in language education. *Journal of Language and Linguistics in Society*, 52, 1–11. <https://doi.org/10.55529/jlls.52.1.11>
- Son, J.-B., Ružić, N. K., & Philpott, A. (2025). Artificial intelligence technologies and applications for language learning and teaching. *Journal of China Computer-Assisted Language Learning*, 5(1), 94–112. <https://doi.org/10.1515/jccall-2023-0015>



- Song, C., & Song, Y. (2023). Enhancing academic writing skills and motivation: assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students. *Frontiers in Psychology, 14*. <https://doi.org/10.3389/fpsyg.2023.1260843>
- Sylvia, N. (2019). PENGAKOMODASIAN SKEMA KOGNITIF MANUSIA: PENGEMBANGAN MATERI AJAR BAGI PENDIDIKAN BAHASA. *Seminar Internasional Riksa Bahasa*.
- Sylvia, N. (2021). *Tingkat Efikasi Guru Bahasa Selama Pembelajaran Jarak Jauh*. 187–204.
- Sylvia, N., & Hadiana, D. (2024). Metode Pembelajaran Bahasa dan Sastra Indonesia di Era Digital. *Indonesian Journal of Education and Learning, 7*(2). <https://doi.org/10.31002/ijel.v7i2.1331>
- Sylvia, N., Saptawuryandari, N., & Zabadi, F. (2023). Penguasaan Guru Terhadap Media Pembelajaran Bahasa. *Kwangsan: Jurnal Teknologi Pendidikan, 11*(1), 279. <https://doi.org/10.31800/jtp.kw.v11n1.p279--295>
- Tutton, M., & Cohen, D. (2025). Reconceptualizing the Role of the University Language Teacher in Light of Generative AI. *Education Sciences, 15*(1), 56. <https://doi.org/10.3390/educsci15010056>
- Urbaite, G. (2025). Adaptive Learning with AI: How Bots Personalize Foreign Language Education. *Luminis Applied Science and Engineering, 2*(1), 13–18. <https://doi.org/10.69760/lumin.20250001002>
- Wang, Y., Wu, J., Chen, F., Wang, Z., Li, J., & Wang, L. (2024). Empirical Assessment of AI-Powered Tools for Vocabulary Acquisition in EFL Instruction. *IEEE Access, 12*, 131892–131905. <https://doi.org/10.1109/ACCESS.2024.3446657>
- Xiao, Y., & Zhi, Y. (2023). An Exploratory Study of EFL Learners' Use of ChatGPT for Language Learning Tasks: Experience and Perceptions. *Languages, 8*(3), 212. <https://doi.org/10.3390/languages8030212>
- Yildiz Durak, H., Eğin, F., & Onan, A. (2025). A Comparison of Human-Written Versus <sc>AI</sc>-Generated Text in Discussions at Educational Settings: Investigating Features for <sc>ChatGPT</sc>, Gemini and <sc>BingAI</sc>. *European Journal of Education, 60*(1). <https://doi.org/10.1111/ejed.70014>
- Yuxuan, Q., Yichen, Z., Xiaohua, H., & Huricha, B. (2025). Empowering Foreign Language Education with Large Language Models: Applications and Insights. *Journal of Higher Education Teaching, 2*(1), 100–101. <https://doi.org/10.62517/jhet.202515114>
- Zhang, L. (2025). Educational Technology in a Cross-cultural Perspective: Applications and Challenges of Generative AI Tools in Language Education in Sino-Foreign Cooperative Programs. *Journal of Humanities, Arts and Social Science, 9*(3), 432–436. <https://doi.org/10.26855/jhass.2025.03.003>
- Zhang, Z., & Huang, X. (2024). The impact of chatbots based on large language models on second language vocabulary acquisition. *Heliyon, 10*(3), e25370. <https://doi.org/10.1016/j.heliyon.2024.e25370>